

Detailed Syllabus
Lecture-wise Breakup

Course Code	17B1NHS531	Semester ODD (specify Odd/Even)	Semester 5 Session 2018 -2019 Month from July 2018-Dec2018
Course Name	Technology and Culture		
Credits	3	Contact Hours	(2-1-0)

Faculty (Names)	Coordinator(s)	Dr Swati Sharma
	Teacher(s) (Alphabetically)	Dr Swati Sharma

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C303-5.1	Understand and apply the main theories in cultural management,	Applying (C4)
C303-5.2	Identify technological convergence and cultural divergence, relate the differences to the literature and suggest solutions	Evaluating(C 5)
C303-5.3	Interpret and communicate effectively in physical and virtual teams by choosing appropriate concepts, logic and selecting the apt IT tools.	Analyzing(C4)
C303-5.4	Application of the theoretical knowledge to adapt to cultural differences in global work environment.	Evaluating(C 5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	<ul style="list-style-type: none"> ▪ Genealogy of the concept ▪ The Information Technology Revolution ▪ The concept of Network societies 	5
2.	Dimensions of Culture	<ul style="list-style-type: none"> ▪ Evolution of Culture ▪ Principal theories of Culture: Kluckhohn and Strodtbeck, Hofstede, Trompenaars and Schwartz ▪ Cultural Diversity and cross cultural literacy 	8
3.	Cross cultural communication in physical and virtual teams	<ul style="list-style-type: none"> ▪ The Communication Process ▪ Language and Culture ▪ Non Verbal Communication ▪ Barriers to Cross Cultural Understanding ▪ Marketing and Culture 	8
4.	Negotiation and Decision Making	<ul style="list-style-type: none"> ▪ Theories of Negotiation ▪ Negotiation and Intercultural Communication ▪ Decision making in cross cultural environment 	2
5.	Cross Culture and Leadership	<ul style="list-style-type: none"> ▪ Leadership and Culture ▪ Theories of Culture centric leadership and their Global Relevance ▪ Developing Competencies for Global citizens ▪ Women as International Leaders 	5

		<ul style="list-style-type: none"> ▪ Cross Cultural Training ▪ Ethical Guidelines for Global Citizens 	
Total number of Lectures			28
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Project, and Oral Viva)	
Total		100	

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Maidenhead. Riding the Waves of Culture: Understanding Cultural Diversity in Business (2012). 3rd edition. McGraw Hill.
2.	Edgar, Andrew and Peter Sedgwick (eds.) Key concepts in Cultural Theory. London. Routledge. 1999
3.	Gerard Bannon, J. (red.). Mattock, Cross-cultural Communication: The Essential Guide to International Business. 2003
4.	Grossberg, L., C. Nelson and P. Treichler (eds.) Cultural Studies. London. 1992
5.	Robertson, Ronald. Globalization: Social theory and global culture, London: Sage, 1992.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NHS532	Semester: Odd	Semester V Session 2018-2019 Month from: July 2018 –Dec 2018
Course Name	Planning and Economic Development		
Credits	03	Contact Hours	2-1-0

Faculty (Names)	Coordinator(s)	Dr. Amba Agarwal (JIIT-128), Dr. Monica Chaudhary (JIIT-62)
	Teacher(s) (Alphabetically)	Dr. Amba Agarwal, Dr. Monica Chaudhary, Mr. Manas R. Behera

COURSE OUTCOMES		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C303-4.1	Understand the issues and approaches to economic development.	Understanding Level (C2)
C303-4.2	Evaluate National income accounting, human development index and sustainable development.	Evaluating Level (C5)
C303-4.3	Apply an analytical framework to understand the structural characteristics of development.	Applying Level (3)
C303-4.4	Analyze the role of Macroeconomic stability & policies and Inflation in the development process.	Analyzing Level (C4)
C303-4.5	Evaluate the importance of federal development and decentralization.	Evaluating Level (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Economic Development and its Determinants	Economic growth and development. Indicators of development. Rostows Stages of Growth. Approaches to economic development.	2
2.	National Income Accounting	National Income Accounting, Green GNP and Sustainable development	4
3.	Indicators of development	PQLI, Human Development Index (HDI) and gender development indices.	3
4.	Demographic Features, Poverty and Inequality	Demographic features of Indian population; Rural-urban migration; Growth of Primary, Secondary and Tertiary Sector.	3
5.	Inflation and Business Cycles	Inflation. Business cycle. Multiplier and Accelerator Interaction.	4
6.	Macro Economic Stability & Policies	Monetary Policy. Fiscal Policy. Role of Central Bank & Commercial banks in the development of the country. Balance of payments; currency convertibility and Issues in export-import policy.	5
7.	Federal Development	The Federal Set-up - The Financial Issues in a Federal Set-up, Principles for Efficient Division of Financial Resources between Governments. Financial Federalism under Constitution. Finance Commissions in India, Terms of References and its Recommendations	4
8.	Planning and Development	Need for planning-Niti Aayog, Decentralisation, Rural and Urban local bodies.	3
Total number of Lectures			28

Evaluation Criteria	
Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Viva & Attendance)
Total	100

Recommended Reading material:	
1.	Meier, G.M. , Leading Issues in Economic Development, Oxford University Press, New Delhi, 1970
2.	Todaro, M.P., Stephen C. Smith , Economic Development, Pearson Education, 2017
3.	Thirwal, A.P. , Economics of Development, Palgrave, 2011
4.	Ghatak, S. , An Introduction to Development Economics, Allen and Unwin, London, 1973
5.	Ahuja, H. L. , Development Economics, S Chand publishing, 2016

Detailed Syllabus
Lecture-wise Breakup

Subject Code	16BINHS536	Semester: ODD (specify Odd/Even)	Semester: V Session: 2018-2019 Month: JULY-DECEMBER
Subject Name	TECHNOLOGY AND GOVERNANCE		
Credits	3	Contact Hours	(2-1-0)

Faculty (Names)	Coordinator(s)	Dr. Santosh Dev
	Teacher(s) (Alphabetically)	Dr. Santosh Dev

Co Code	Course Objective	Cognitive Level
C303-3.1	Understand the concepts and processes of governance in Indian context	Understanding (C2)
C303-3.2	Critically appraise the importance of technological intervention in governance	Evaluating (C5)
C303-3.3	Examine and appraise Digital India campaign and design solution	Creating (C6)
C303-3.4	Design technological intervention to solve society problems	Creating (C6)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction to the Course	What is Governance? General Introduction about the importance and usability	3
2.	Relation of Technology and Governance	The beginnings of technology Technology and society Technology and culture Technology and Economy Technology and Individual	4
3.	How Information Technology and the Internet Have Changed the World;	Development of technology and globalization	3
4.	E-Frameworks	A Framework for E-Government: E-Government Principals, E-Services, E-Democracy, E-Management; Strategic Planning	5
5	Digital India	What is Digital India? DeitY, Vision of Digital India, Nine Pillars of Digital India, Institutional Mechanisms at National Level, Composition of Monitoring Committee on Digital India, Challenges & Changes Needed	5
6	Governance Models	Collaborative Governance Model,	

		Good Governance Model	2
7.	Different Uses and the Governance Analytical Framework	Governance as Process, Public Governance, Private Governance, Global Governance, Non Profit Governance, Corporate Governance.	4
8.	Different Uses and the Governance Analytical Framework	Project Governance, Environmental Governance, Internet Governance, Information Technology Governance, Regulatory Governance, Participatory Governance, Multilevel Governance, Meta-Governance and Collaborative Governance.	2
Total number of Lectures			28

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Mark Bevir, <i>Governance: A very short introduction.</i> , Oxford University Press Oxford, UK (2013)
2.	<p>Research Papers:</p> <p>Alexandra Mateescu, Alex Rosenblat and danah boyd, Policy Body-Worn Cameras http://www.datasociety.net/pubs/dcr/PoliceBodyWornCameras.pdf, February 2015.</p> <p>Fung, Archon; Graham Mary, Weil David, Full Disclosure: The Perils and Promise of Transparency, 2008.</p> <p>Gurstein, M. B., Open data: Empowering the empowered or effective data use for everyone? First Monday, (2011) 16(2)</p> <p>Veeraraghavan, Rajesh, Introduction & Conclusion in Open Governance and Surveillance: A Study of the National Rural Employment Guarantee Program in Andhra Pradesh, India. (2015).</p> <p>Li, Tania, The Will to Improve: Governmentality, Development, and the Practice of Politics. 2007</p> <p>Benjamin, S., Bhuvanewari, R., & Rajan, P., Bhoomi : ‘ E-Governance ’, Or , An Anti-Politics Machine Necessary to Globalize Bangalore ? (2007). (January), 1-53.</p>

Detailed Syllabus
Lecture-wise Breakup

Subject Code	18B12HS311	Semester ODD	Semester 5 Session 2018-19 Month from July 2018 to December 2018
Subject Name	STRATEGIC HUMAN RESOURCE MANAGEMENT		
Credits	3	Contact Hours	2-1-0
Faculty (Names)	Coordinator(s)	Praveen Sharma (Sec-128), Santoshi Sengupta (Sec-62)	
	Teacher(s) (Alphabetically)	Praveen Sharma, Santoshi Sengupta	

COURSE OUTCOMES		COGNITIVE LEVELS
C303-6.1	Understand human resource management from a strategic perspective and analyze environmental challenges that impact HRM of an organization	Analyze Level (C4)
C303-6.2	Assess the human resource needs of the organization and design recruitment and selection strategies for an organization	Evaluate Level (C5)
C303-6.3	Evaluate the processes of training and development, mentoring, performance management, compensation and reward management in an organization and design effective strategies for the same	Evaluate Level (C5)
C303-6.4	Critically assess career management system, work-life initiatives and other HRM practices of the organization	Evaluate Level (C5)

Module No.	Subtitle of the Module	Topics in the module	No. of Hours for the module
1.	Introduction	Role of HR in strategy; Evolution of SHRM; Strategic fit: Conceptual Framework; Theoretical Perspectives on SHRM; SHRM approaches in Indian context	4
2.	Strategic Human Resource Environment and Evaluation	Overview of the environment; SHRM in Knowledge Economy; HRM and Firm Performance; Rationale for HR Evaluation; Approaches to HR Evaluation	4
3.	Strategic Human Resource Planning and Acquiring	Overview of HRP; Objectives of HRP; Job Analysis and SHRM; External and Internal Influences on Staffing; Recruitment: Sources, Methods and Approaches; Selection: Methods and Approaches; Strategic Recruitment and Selection	6
4.	Training, Development, Mentor Relationships	Basic Concepts, Purposes & Significance of Training and Development; HRM Approaches; Linkage between Business Strategy and training; Process; new Developments; Concept and outcomes of mentoring; Strategic approach of Mentoring relationships	4
5.	Strategic Performance Management; Compensations and Reward Management; Career Management	Developing performance management systems; Technology and performance management; Strategic Linkage of performance management; Determinants and approaches of compensation and rewards; New Developments; Business Strategy and compensation; Career Management systems; SHRM approach to career management	6
6.	Work Life Integration and International HRM	HRD Approaches to work-life integration; Development of work-life initiatives; Strategic approach to work-life integration; External HRM; IHRM practices	4
Total number of Lectures			28

Evaluation Criteria	
Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Projects -Report and Viva, Oral Questions)
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Tanuja Agarwala, Strategic Human Resource Management, 1 st edition, Oxford University Press, 2007
2.	Stephen J. Perkins, Susan M. Shortland, Strategic International Human Resource Management: Choices and Consequences, Kogan Page, 2010
3.	John storey, Patrick Wright and Dave Ulrich, Strategic Human Resource Management, Routledge Taylor and Francis Group, 2009

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11EC511	Semester Odd (specify Odd/Even)	Semester V Session 2018 -2019 Month from July to December
Course Name	Digital Communication		
Credits	04	Contact Hours	3-1-0

Faculty (Names)	Coordinator(s)	Dr. Anand Agrawal, Dr. Reema Budhiraja
	Teacher(s) (Alphabetically)	Dr. Ashish Goel, Dr. Anand Agrawal, Dr. Dhermendra Sadhwani, Dr. Megha Agrawal, Ms. Bhawna Gupta, Dr. Richa Gupta

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Understand the concepts of Sampling process, time division multiplexing and GSOP.	Understanding (Level II)
CO2	Understand the concepts of waveform coding techniques, PSD of different line coding schemes and analysis of ISI Mitigation Techniques	Analyzing (Level IV)
CO3	Understand the concepts of digital modulation techniques and evaluate their probability of error and bandwidth efficiency.	Evaluating (Level V)
CO4	Understand the concepts of error control coding schemes.	Understanding (Level II)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Merits and demerits of digital signals, sampling theorem in frequency domain and time domain, Nyquist criteria, reconstruction using interpolation filters, ideal, natural and flat top sampling, aperture effect	8
2.	Waveform coding techniques	PCM generation and detection, quantization, quantization error, non uniform quantization, companding, differential PCM, Delta modulation, Adaptive delta modulation, Data encoding formats, PSD of Line codes, ISI, ISI Mitigation Techniques. GSOP.	8
3.	Digital Modulation Techniques	Binary & M-ary modulation techniques: FSK, PSK, DPSK, M-ary PSK, Minimum Phase Shift Keying (MSK) and Quadrature Amplitude Modulation	10
4.	Performance Analysis of Digital Systems	Probability of error analysis – Optimum filter, Matched filter, Coherent & Non – Coherent Reception, Probability of error for FSK, PSK, DPSK, M-ary PSK, Minimum Phase Shift Keying (MSK). Introduction to bit Vs symbol error probability & Bandwidth	10
5.	Digital Systems and error control	Digital radio, Plesiochronous and Digital Synchronous Hierarchy standards, introduction to error control	6

Total number of Lectures		40
Evaluation Criteria		
Components	Maximum Marks	
T1	20	
T2	20	
End Semester Examination	35	
TA	25	
Total	100	

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	S. Haykin, Digital Communications, John Wiley & Sons, 2001.
2.	H. Taub & D. L. Schilling, Principles of Communication Systems, 2nd edition, McGraw-Hill Higher Education
3.	A. Bhattacharya, Digital Communication, 1 st edition, TMH, 2006.
4.	B. Sklar, Digital Communications Fundamentals & Applications, 2 nd edition, Pearson Education, 2007.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH533	Semester Odd	Semester V Session 2018 -2019 Month from July to December
Course Name	Laser Technology and Applications		
Credits	4	Contact Hours	4

Faculty (Names)	Coordinator(s)	Navneet Kumar Sharma and Amit Verma
	Teacher(s) (Alphabetically)	Navneet Kumar Sharma and Amit Verma

COURSE OUTCOMES		COGNITIVE LEVELS
C301-12.1	Define the coherent properties, high brightness of laser, population inversion and optical feedback to laser technology	Remember Level (C1)
C301-12.2	Extend the knowledge of lasers in some applications like LIDAR, laser tracking, bar code scanner, lasers in medicine and lasers in industry	Understand Level (C2)
C301-12.3	Apply the optical ray transfer matrix to determine the stability of a laser resonator	Apply Level (C3)
C301-12.4	Distinguish the operational principles of CW, Q-switched, mode locked lasers; laser rate equations for three & four level lasers; different types of laser systems	Analyze Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Fundamentals of Lasers	Laser idea and properties; Monochromaticity, directionality, brightness, Temporal and spatial Coherence. Interaction of radiation with matter; Absorption, spontaneous and stimulated emission of radiation, Rates equations, Einstein's A and B coefficients. Laser rate equations: Four level and three level systems. Conditions for producing laser action, population inversion, saturation intensity, threshold condition and gain optimization. Experimental techniques to characterize laser beam.	12
2.	Types of Lasers	Pumping processes; optical and electrical pumping. Optical Resonators; The quality factor, transverse and longitudinal mode selection; Q switching and Mode locking in lasers. Confocal, planar and spherical resonator systems. Types of Lasers; Solid state Lasers; Ruby Laser, Nd:YAG laser. Gas lasers; He-Ne laser, Argon laser, CO ₂ , N ₂ and Excimer Laser. Dye (liquid) Laser, Chemical laser (HF), Semiconductor Lasers; Heterostructure Lasers, Quantum well Lasers. Free electron laser, X-ray laser and Ultrafast Laser.	16
3.	Applications of Lasers	Image processing; Spatial frequency filtering and Holography, Laser induced fusion; Fusion reactor, creation of Plasma. Lightwave communications. Use in optical reader (CD player) and writer. Nonlinear optics; harmonic generation, self focusing. Lasers in industry; Material processing, Cutting, welding and whole drilling. Precision	12

		length measurement, velocity measurement, Laser Tracking, Metrology and LIDAR. Lasers in medicines and surgery. Lasers in defense, Lasers in space sciences, Lasers in sensors.	
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Total number of Lectures		40
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Evaluation Criteria	
Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Thyagarajan and Ghatak, <i>Lasers Theory and Applications</i> , Macmilan India.
2.	W. T. Silfvast, <i>Laser Fundamentals</i> , Cambridge Univ-Press.
3.	O. Svelto, <i>Principles of Lasers</i> , Springer.
4.	Saleh and Teich, <i>Fundamentals of Photonics</i> , John Wiley & Sons.

Detailed Syllabus

Lecture-wise Breakup

Course Code	17B1NMA532	Semester Odd (specify Odd/Even)	Semester V Session 2018 -2019 Month from July – Dec 2018
Course Name	Computer Based Numerical Techniques		
Credits	4	Contact Hours	3-1-0
Faculty (Names)	Coordinator(s)	Dr. Pankaj Kumar Srivastava	
	Teacher(s) (Alphabetically)	Dr. Pankaj Kumar Srivastava	
COURSE OUTCOMES			COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:			
C301-6.1	explain the concepts of approximation and errors in computation.	Understanding Level (C2)	
C301-6.2	apply numerical methods for solving algebraic and transcendental equations along with their convergence.	Applying Level (C3)	
C301-6.3	apply divided difference, finite difference and splines formulae for numerical interpolation.	Applying Level (C3)	
C301-6.4	solve ordinary differential and integral equations using numerical methods.	Applying Level (C3)	
C301-6.5	explain the basics of MATLAB software and its applications in finding numerical solutions.	Understanding Level (C2)	

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Errors in numerical computation and Approximation	Accuracy of numbers, Errors and its types, Error in numerical computations, Error in series approximation, Floating point representation of numbers, Arithmetic operations with normalized floating point representation of numbers, Machine computation, Synthetic division of a polynomial, Diminish of the root of equation by a constant value, Horner's method to find positive root, Evaluation of negative root by changing polynomial	9
2.	Solution of Algebraic and Transcendental Equations	Locating roots, Bisection method, Regular-Falsi method, Newton Raphson method, Rate of convergence of Newton Raphson method, Secant method, Comparison of Secant method and Newton Raphson method	8
3.	Interpolation	Forward, Backward and central Finite Difference Operators, Fundamental theorem of finite difference, Finite Difference Tables, Factorial function and Reciprocal factorial function, Approximation of function by Taylor's series, Curve fitting, Spline Interpolation, Cubic Spline and Approximation, Errors in cubic spline and its derivatives.	8
4.	Numerical Solution of Differential and Integral Equations	Runge-Kutta method to solve ODE, Solution of Laplace Equation, Solution of Fredholm equations, Method of degenerate Kernels, Spline method	8

5.	Application using MATLAB	MATLAB Introduction, Matrix operations, Solution of System of Linear Equations, Polynomial evaluation, Polynomial roots and operations, Polynomial Derivatives, Differentiation of functions, Polynomial Curve fitting, Integration, Standard numerical techniques in MATLAB	9
Total number of Lectures			42
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Quiz , Assignments, Tutorials)	
Total		100	
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)			
1.	M. K. Jain, S. R. K. Iyengar and R. K. Jain, <i>Numerical Methods for Scientific and Engineering Computations</i>, New Age International Publishers, 2008.		
2.	Gerald and Wheatley, <i>Applied Numerical Analyses</i>, AW, 1970.		
3.	V. Rajaraman, <i>Computer Oriented Numerical Methods</i>, PHI Learning Pvt. Ltd., 2018		
4.	P. Niyogi, <i>Numerical Analysis and Algorithms</i>, Tata McGraw-Hill Education India, 2003		
5.	B. S. Grewal, <i>Numerical methods in Engineering and Science</i>, Khanna Publishers, Delhi, 2013.		
6.	S. S. Ray, <i>Numerical Analysis with Algorithms and Programming</i>, CRC Press, 2016.		

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NMA531	Semester Odd (specify Odd/Even)	Semester V Session 2018 -2019 Month from July to December
Course Name	DISCRETE MATHEMATICS		
Credits	4	Contact Hours	3-1-0
Faculty (Names)	Coordinator(s)	Dr. Anuj Bhardwaj	
	Teacher(s) (Alphabetically)	Dr. Anuj Bhardwaj	
COURSE OUTCOMES: After the successful completion of this course, the student will be able to			COGNITIVE LEVELS
C301-1.1	explain partial order relations, Hasse diagram, lattices and recursive functions.		Understanding Level (C2)
C301-1.2	solve the difference equations using generating function and Z-transform.		Applying Level (C3)
C301-1.3	explain the propositional and predicate calculus to check the validity of arguments.		Understanding Level (C2)
C301-1.4	demonstrate graphs, digraphs, trees and use it to solve the different problems of graph theory.		Applying Level (C3)
C301-1.5	illustrate various algebraic structures and their properties.		Understanding Level (C2)
C301-1.6	explain the theory of formal languages and solve the related problems of automata.		Applying Level (C3)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Relations and Lattices	Relations and their composition. Pictorial representation, matrix and graphical representations. Equivalence relations and partitions. Partial ordered relations and Hasse diagram. Lattices.	5
2.	Functions	Functions and Recursively defined functions, generating functions, solution of recurrence relations by generating function. Z transforms, solution of difference equations by Z transform.	8
3.	Propositional Calculus	Propositions- simple and compound. Basic logical operators. Implication. Truth tables. Tautologies and contradictions. Valid arguments and fallacy. Propositional functions and quantifiers.	4
4.	Graphs	Graphs and related definitions, subgraphs, isomorphism, paths and connectivity. Eulerian graph and Konigsberg	7

		problem. Hamiltonian graph. Labelled and weighted graphs. Tree Graphs-Minimum spanning Tree (Prim's algorithm). Graph colorings. Four color problem.	
5.	Directed Graphs	Trees, Digraphs and related definitions. Rooted trees. Algebraic expressions and Polish notation. Sequential representation. Adjacency matrix. Path matrix. Shortest path. Linked representation of directed graphs. Binary trees.	5
6.	Algebraic Structures	Groups- definitions and examples, order of elements, subgroup, condition for subgroups. Quotient groups, Lagrange theorem and applications, Rings, integral domains and Fields- definition and examples.	7
7.	Languages and Grammars	Strings (words) and languages, grammars, types of grammars, Finite state machines, finite state automata, regular languages and regular expressions.	6
Total number of Lectures			42
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Quiz, Assignments, Tutorials)	
Total		100	
Recommended Reading material:			
1.	Lipschutz, S. and Lipson, M., Discrete Mathematics, 2 nd Edition, Tata McGraw-Hill, 1997.		
2.	Rosen, K. H., Discrete Mathematics and its Application, 5 th Edition, Tata McGraw-Hill, 2003.		
3.	Liu, C. L., Elements of Discrete Mathematics, 2 nd Edition, Tata McGraw-Hill, 1985.		
4.	Kolman, B., Busby, R. C. and Ross, S., Discrete Mathematical Structures, 3 rd Edition, Prentice Hall, 1996.		
5.	Deo, N., Graph Theory, Prentice Hall, 1980.		
6.	Grimaldi, R.P., Discrete and Combinatorial Mathematics, 4 th Edition, Pearson Education, 2005.		

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NMA532	Semester Odd (specify Odd/Even)	Semester V Session 2018 -2019 Month from July 2018-Dec 2018
Course Name	Finite Element Methods		
Credits	4	Contact Hours	3-1-0

Faculty (Names)	Coordinator(s)	Dr. Lokendra Kumar
	Teacher(s) (Alphabetically)	

COURSE OUTCOMES		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C301-2.1	explain different numerical methods for the solution of simultaneous linear equations.	Understanding Level (C2)
C301-2.2	solve ordinary differential equations using 4th order Runge-Kutta and finite difference methods.	Applying Level (C3)
C301-2.3	apply methods of weighted residuals for the solutions of boundary value problems.	Applying Level (C3)
C301-2.4	construct the weak formulation and derivation of shape functions for one and two dimensional problems.	Applying Level (C3)
C301-2.5	organise the elementwise assembly to solve the two point boundary value problems using finite element method.	Applying Level (C3)
C301-2.6	apply finite element method on partial differential equations with given boundary conditions.	Applying Level (C3)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Basic Numerical Methods	Gauss-elimination, Gauss Seidel, Thomas algorithm, Gaussian quadrature formula for numerical integration, Runge-Kutta method for IVPs, Finite difference method for BVPs.	10
2.	Finite Element Method	Introduction to finite element method, comparison with finite difference method.	3
3.	Method of Weighted Residuals	Collocation, Subdomain, Method of least squares and Galerkin's method.	8
4.	Variational Formulation	Variational formulation of boundary value problems. Equivalence of Galerkin and Ritz method in some cases. Applications to solve simple problems of ODEs. One dimensional linear, quadratic and higher order elements. Derivation of element equations and their assembly,	12

		imposition of boundary conditions and solution of assembled equations.	
5.	Partial Differential Equations	Two dimensional, triangular, rectangular, quadrilateral, serendipity and isoperimetric elements and their assembly. Discretization with curved boundaries. Solution of two dimensional partial differential equations under different Geometric conditions.	9
Total number of Lectures			42
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Quiz, Assignments, Tutorials)	
Total		100	

Recommended Reading material:	
1.	J. N. Reddy , An Introduction to the Finite Element Method, McGraw-Hill, New York, 1993.
2.	L. J. Segerlind , Applied Finite Element Analysis, 2 nd Edition, John Wiley and Sons, 1984.
3.	O. C. Zienkiewicz and R. L. Taylor , The Finite Element Method, 3 rd Edition, McGraw-Hill, 1989.
4.	D. L. Logan , A First Course in the Finite Element Method, 2 nd Edition, PWS Publishing Company, Boston, 1993.
5.	R. D. Cook, D. S. Malkus and M. E. Plesha , Concepts and Applications of Finite Element Analysis, 3 rd Edition, John Wiley and Sons, New York, 1989.
6.	K. J. Bathe , Finite Element Procedures in Engineering Analysis, Prentice-Hall, Englewood Cliffs, NJ, 1982.
7.	Gupta, R.S. , Elements of Numerical Analysis, 1st Ed., Macmillan 2009.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NMA533	Semester - Odd (specify Odd/Even)	Semester V Session 2018 -2019 Month from July 2018 - Dec 2018
Course Name	Matrix Computations		
Credits	4	Contact Hours	3-1-0
Faculty (Names)	Coordinator(s)	Dr. Pato Kumari and Dr. Amita Bhagat	
	Teacher(s) (Alphabetically)	Dr. Amita Bhagat Dr. Pato Kumari	
COURSE OUTCOMES			COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:			
C301-3.1	explain the basics of matrix algebra and inverse of a matrix by partitioning.	Understanding level (C2)	
C301-3.2	solve the system of linear equations using direct and iterative methods.	Applying Level (C3)	
C301-3.3	explain the vector spaces and their dimensions, norm of a vector and matrix.	Understanding level (C2)	
C301-3.4	apply the concepts of inner product space to construct Q-R decomposition and orthonormal basis using Gram-Schmidt process.	Applying Level (C3)	
C301-3.5	construct Gershgorin's circles and solve eigenvalue problems including power and inverse power methods.	Applying Level (C3)	
C301-3.6	analyze systems of differential and difference equations arising in dynamical systems using matrix calculus.	Analyzing Level (C4)	
Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Matrix Algebra	Basics of matrices, Submatrices, rank of a matrix, Normal Form, Inverse of a matrix by Gauss Jordan Method, Inverse of a matrix by partitioning method and by elementary matrices	6
2.	Linear System of equations	Existence and uniqueness of solution for system of linear equations, Gauss elimination method, Pivoting strategies, Gauss Jacobi and Gauss Siedel method, LU decomposition, Crout's and Doolittle's method	9
3.	Vector and Inner Product Spaces	Vector spaces, Subspaces, Linearly independent and dependent set of vectors, dimension and basis of vector space, Norms of vectors and matrix, Inner product space, orthogonal and orthonormal sets, Projections, Gram-Schmidt process, Q-R decomposition	10
4.	Eigen value Problems	Eigen values and Eigenvectors, Greshgorin's circle, Power and Inverse power methods, Similar, modal and diagonalizable matrices, Quadratic, positive definite and Canonical forms	9

5.	Matrix Calculus	Powers and functions of matrices, Application to solve discrete dynamical systems, solution of initial value problems	8
Total number of Lectures			42
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Quiz, Assignments, and Tutorials)	
Total		100	
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)			
1.	Bronson, R. , Matrix Methods an Introduction, Academic Press, 1991.		
2.	Golub, G. H. , Matrix Computations, Johns Hopkins University Press, 1996.		
3.	Datta, K. B. , Matrix and Linear Algebra, Prentice Hall of India, 1990.		
4.	David, W. Lewis. , Matrix Theory, World Scientific, 1991.		

Detailed Syllabus
Lab-wise Breakup

Course Code	15B19EC591	Semester Odd (specify Odd/Even)	Semester 5th Session 2018 -2019 Month from July
Course Name	Minor Project -1		
Credits	5	Contact Hours	...

Faculty (Names)	Coordinator(s)	Mr. Raghvenda Kumar Singh
	Teacher(s) (Alphabetically)	Dr. Vimal Kumar Mishra

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Identifying, planning and initiation of the individual projects in the domain selected by them, respectively.	Applying (III)
CO2	Analyze the potential research areas in the field of Embedded Systems, Signal Processing, VLSI, Communication, Artificial Intelligence and Machine Learning/Deep Learning etc.	Analyzing (IV)
CO3	Survey the available literature and gain knowledge of the State-of-Art in the chosen field of study.	Analyzing (IV)
CO4	Evaluate the existing algorithms of the domain selected and improvise the algorithm so that it yields better results than the existing metrics.	Evaluating (V)
CO5	Design and implement a working model, using various hardware components, which works as a prototype to showcase the idea selected for implementation.	Creating (VI)

Evaluation Criteria	
Components	Maximum Marks
Mid Term	20 (Viva)+20(Day to Day)
End Term	20 (Viva)+20(Day to Day)+20(Report)
Total	100

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17EC571	Semester (specify Odd/Even)	Semester V Session 2018 -2019
Course Name	Digital Communication Lab		
Credits	1	Contact Hours	2

Faculty (Names)	Coordinator(s)	Dr. Megha Agarwal, Ms. Bhawana Gupta
	Teacher(s) (Alphabetically)	Abhishek Kashyap, Anand Agrawal, Ashish Goel, Dharmendra Sadhwani, Bhawana Gupta, Megha Agarwal, Reema Budhraj

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Learning about DSO functioning, Function Analyzer, bread board, and circuit connection. Sampling and quantization of an analog signal. Generation & detection of ASK, FSK & PSK using trainer kit.	Understanding (Level II)
CO2	Design circuits for Amplitude Shift Keying, Frequency Shift Keying and Phase Shift Keying using IC LF 398. Understanding of the concept of different line coding schemes and draw corresponding waveforms.	Analyzing (Level IV)
CO3	Understanding the concept of modulation and demodulation.	Understanding (Level II)
CO4	Implement Pulse Code Modulation, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation, Quadrature Amplitude Modulation and their demodulation on trainer kit.	Analyzing (Level IV)

Module No.	Title of the Module	List of Experiments	CO
1.	Experiment 1	Design a circuit to sample a given signal using IC LF398 and reconstruct the signal from sampled waveform	1
2.	Experiment 2	Implement and Test Amplitude Shift Keying Circuit using IC LF 398.	1,2
3.	Experiment 3	Implement and Test Frequency Shift Keying Circuit using IC LF 398.	1,2
4.	Experiment 4	Implement and Test Phase Shift Keying Circuit using IC LF 398.	1,2
5.	Experiment 5	Study of various Line coding Schemes.	2
6.	Experiment 6	Study of PCM with Three Modes of Transmission.	3,4
7.	Experiment 7	Study of Differential Pulse Code Modulation and Demodulation Technique.	3,4
8.	Experiment 8	Study of Delta Modulation Demodulation.	3,4
9.	Experiment 9	Study of Adaptive Delta Modulation and Demodulation.	3,4
10.	Experiment 10	Study of QAM generation & detection.	3,4
11.	Experiment 11	Generation & detection of ASK, FSK & PSK using trainer kit.	1

Evaluation Criteria	
Components	Maximum Marks
V1	20

V2	20
D2D	60
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	H. Taub & D. L. Schilling, Principles of Communication Systems, 2nd edition, McGraw-Hill Higher Education
2.	S. Haykin, Digital Communications, John Wiley & Sons, 2001.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11EC612	Semester Odd (specify Odd/Even)	Semester 5th Session 2018 -2019 Month from ...
Course Name	Electromagnetic Engineering		
Credits	4	Contact Hours	3-1-0

Faculty (Names)	Coordinator(s)	Ashish Gupta (JIIT-128), Dr. Dharmendra Kumar Jhariya (JIIT-62)
	Teacher(s) (Alphabetically)	Mr. Raghvendra Kumar Singh, Dr. Hemant Kumar, Mr. Vishal Saxena, Ms. Monika

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Recall concepts of vector calculus to solve complex problems and relate among different coordinate systems. Explain the basic principles of electrostatics and magnetostatics and relate the electric and magnetic fields using Maxwell's Equations.	Understanding Level (C 2)
CO2	Illustrate the propagation of electromagnetic waves in different medium and their reflection and transmission parameters. Distinguish among different wave polarizations.	Applying Level (C 3)
CO3	Estimate the current, voltage and power for the different types of transmission lines, determine reflection parameters. Demonstrate the Waveguide theory, Wave equations, and evaluate different waveguide parameters.	Evaluating Level (C 5)
CO4	Classify and compare the different parameters associated with the antenna and also interpret the radiation mechanism.	Understanding Level (C 2)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introductory material	Review of scalar, vector fields and coordinate systems (cylindrical and spherical coordinate) Electrostatic and Magneto static Fields	6
2.	Maxwell's Equations	Inconsistency of Amperes law, Continuity equation, Displacement current, Maxwell's equations, Boundary conditions	4
3.	Electromagnetic Waves	Wave propagation in free space, Conductors and dielectrics, Polarization, Plane wave propagation in conducting and non conducting media, Phasor notation, Phase velocity, Group velocity; Reflection at the surface of the conductive medium, Surface Impedance, Depth of penetration. Transmission line analogy	11
4.	Poynting Vector and Power	Poynting theorem, Poynting Vectors and power loss in a plane conductor.	4
5.	Transmission Lines	Transmission line equations, characteristic impedance, open and short circuited lines, standing wave and reflection losses. Impedance matching, Smith Chart, Simple and double stub matching	6
6.	Wave guides	Rectangular and circular wave guides- Modes in rectangular and cylindrical coordinates, characteristics, power transmission and losses, excitation of modes. Microwave	8

		coaxial connectors. Rectangular, Circular and semi-circular cavity resonators, Q factor.	
7.	Radiation and Antennas	Scalar and vector potentials. Radiation from a current filament, Antenna characteristics, radiation pattern, radiation intensity, directivity and power gain.	3
Total number of Lectures			42

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (12 Marks for assignments + 5 Marks Quiz + 8 Marks for Attendance)
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	J.D. Kraus and D. Fleisch, <i>Electromagnetics with Applications</i> , McGraw-HILL, New York, 5 th Edition, 1999
2.	R. Plonsey and R. E. Collin, <i>Principles and Applications of Electromagnetic Fields</i> , McGraw Hill, 1982.
3.	D.K. Cheng, <i>Field and wave Electromagnetics</i> , Pearson Education, 2 nd Edition, 2001.
4.	M.N.O. Sadiku, <i>Elements of Electromagnetics</i> , Oxford University Press, 3 rd Edition, 2005.
5	Electromagnetic Engineering by W.H. Hayt and J.A. Buck, (2007) The Tata McGraw Hill Companies

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11GE301	Semester Odd (specify Odd/Even)	Semester VSession 2018 -2019 Month from:July to December
Course Name	Environment Sciences		
Credits	3	Contact Hours	3

Faculty (Names)	Coordinator(s)	Prof. Krishna Sundari S
	Teacher(s) (Alphabetically)	1. Ekta Bhatt 2. Dr. GarimaMathur 3. Prof. Krishna Sundari S 4. Manisha Singh 5. Prof. PammiGaubha 6. Dr. Susinjan Bhattacharya

COURSE OUTCOMES		COGNITIVE LEVELS
C309.1	Explain different aspects of environment, ecosystem and associated concerns	Understand Level (C2)
C309.2	Identify various practices that can impact the environmental resource management	Apply Level(C3)
C309.3	Apply modern techniques including sustainable solutions and green technologies for a better environment	Apply Level(C3)
C205.4	Survey ground situation on specific environmental aspects, examine risks involved, make a field report and present the findings	Analyze Level(C4)
C205.5	Recall environment related Government regulations, policies, safety norms and Laws.	Remember Level(C1)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	The Multidisciplinary nature of environmental studies & Biodiversity	Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, Biogeochemical cycles, Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity Case studies.	5
2.	Natural resources, Energy consumption & conservation, Global Conventions	Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources, Global Conventions on Energy, Kyoto protocol, Case studies .	8
3.	Pollution, hazardous waste management	Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, Electronic waste, Radioactive materials, toxicity limits of pollutants. Critical issues concerning Global environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and their roots in: cultural, social, political, commercial, industrial, territorial domains, Case studies.	9

4.	Urban planning, Disaster management	Sustainable building, Analyses of seismic data including magnitude and epicenters of earthquakes, Disaster Management and Contingency Planning, Modern safety systems, Case studies.	6
5.	Environmental Impact assessment, Use of Satellite Imaging	Objectives of impact assessment, Study of impact parameters, Methods for impact identification, Economics, Remote sensing imagery from satellite sensors and role in environmental impact studies, Case studies.	5
6.	Sustainability & Planned reversal of human destruction to environment	Redevelopment of brown fields, energy plantations, social forestry, engineering aspects of Re-use & Recycling, biogas for marginal income groups, organic farming, eco-consumerism, dematerialization, green technologies, eco-tourism, Case studies.	5
7.	Environmental Laws & Regulations	Regulation of technology and innovation, Policy and laws, Different Acts such as: Environmental Protection Act, Air and Water Acts, Wildlife and Forest Acts), US-EPA, National Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities, Eco-mark Scheme, Laws relating to Urban and Rural land use, Ethics, Case studies.	4
8.	Field Work	Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc	5

Total number of Lectures

47

Evaluation Criteria

Components

Maximum Marks

T1	20
T2	20
End Semester Examination	35
TA	25 (Assignments, Attendance)
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Chiras D D.(Ed.). 2001. Environmental Science – Creating a sustainable future. 6 th ed. Jones &Barlett Publishers.
2.	Joseph, B., 2005, Environmental Studies, Tata McGraw Hill, India
3.	Textbook of Environmental Studies for UG Courses - ErachBharucha, University Press
4.	Jogdanand S N 2004. Environmental Biotechnology: Industrial Pollution Management. Himalaya Pub. House, Delhi 284p
5.	David P Lawrence. 2003. Environment Impact assessment, Wiley publications
6.	Issues of the Journal: Down to Earth, published by Centre for Science and Environment

Detailed Syllabus

Lab-wise Breakup

Course Code	15B17CI579	Semester Odd (specify Odd/Even)	Semester 5 th (ECE) Session 2018 -2019 Month from Jul-Dec
Course Name	UNIX Programming Lab		
Credits	1	Contact Hours	2 per week (Total 14 weeks)

Faculty (Names)	Coordinator(s)	Dr. Adwitiya Sinha
	Teacher(s) (Alphabetically)	Dr. Adwitiya Sinha, Purtee Kohli

COURSE OUTCOMES		COGNITIVE LEVELS
CO 1	Demonstrate use of common Unix/Linux commands	Understanding Level (Level 2)
CO 2	Apply Unix/Linux file redirection and pipelining to combine utilities to perform complex tasks	Apply Level (Level 3)
CO 3	Develop shell scripting using Selection, Case & Conditional Statements	Apply Level (Level 3)
CO 4	Build shell scripts to solve various problems using commands like grep, line number, test, expressions, compare, command line input, etc.	Apply Level (Level 6)
CO 5	Create and manage files and directories, file permissions, and navigate the Unix/Linux file system	Create Level (Level 6)

Module No.	Title of the Module	List of Experiments	CO
1.	The UNIX File System & Basic Commands	History of UNIX, Introduction, UNIX file system, Executing commands & options	CO1
2.	UNIX Editor & Operations	UNIX Processes, Process Utilities, Pipes and Signals	CO2
3.	UNIX File Handling & Regular Expressions	File Handling, File commands, Basic Filters (cat, head, tail, sort, uniq), Use of Regular Expressions, Field Matching, grep, fgrep, egrep	CO2
4.	UNIX Advanced Filters	Advanced Pattern Matching, Stream-oriented & Non-Interactive Text Editor (Sed), Programmable Filters, Awk, Gnu Awk (Gawk), Text Processing, Practical Extraction and Report Language (Perl)	CO3
5.	UNIX Shell Scripting	UNIX Scripting, Variables, Naming Conventions, Conditional Constructs, Looping Statements, Arrays, Functions, Document Handling, Quoting, Arithmetic Operations & Executions, Parsing	CO4

6.	UNIX Administration	UNIX Administration, Overview of Linux, Login Process, Users & Permission (chmod, su, mount, cron, NFS), Process Management	CO5
7.	UNIX Case Studies	Projects, Application-based Extensions, Security	CO5
Evaluation Criteria			
Components		Maximum Marks	
Lab Test-1		20	
Lab Test-1		20	
Day-to-Day		60 (Quiz + Evaluative Assignment + Class Test + Attendance)	
Total		100	

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Sumitabha Das, UNIX Concepts & Applications, 4 th Edition, Tata McGraw-Hill Education, 2008
2.	Maurice J. Bach, Design of UNIX Operating System, Prentice-Hall, 1986
3.	Richards Stevens, Advanced Programming in the UNIX Environment, Pearson Education India, 2005
4.	Marc J. Rochkind, Advanced UNIX Programming, 2 nd Edition, Pearson Education, 2004
5.	Evi Nemeth, Garth Snyder, Trent R. Hein, Unix and Linux System Administration Handbook, 4 th Edition Pearson Education India, 2011
6.	Richards Stevens, Unix Network Programming, Addison-Wesley Professional, 2004